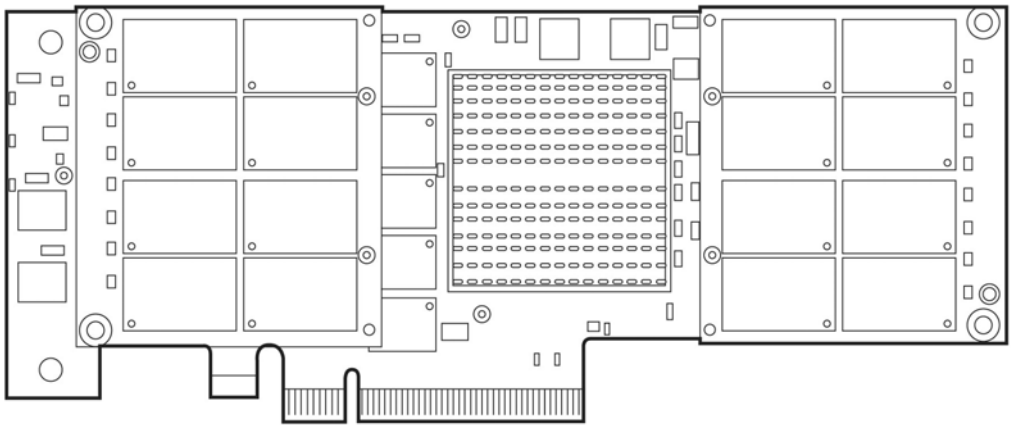
Overview

HP PCIe Workload Accelerators for ProLiant Servers

Could your data center benefit from PCIe workload acceleration based on NAND Flash solid-state storage technology?

HP PCIe Workload Accelerators for ProLiant ML/DL/SL Servers are PCIe card-based direct-attach solutions offering amazing performance with low latency and enterprise reliability.



PCIe Workload Accelerators HH/HL

What's New

- HP 6.4TB, 3.2TB, 1.6TB, and 1.3TB Value Endurance (VE) PCIe Workload Accelerators
- HP 5.2TB, 2.6TB, 1.3TB and 1.0TB Light Endurance (LE) PCIe Workload Accelerators

Models

HP PCIe Workload Accelerator Options	**Value Endurance (VE) PCIe Workload Accelerators**	
	HP 6.4TB FH/HL Value Endurance (VE) PCIe Workload Accelerator	763840-B21
	HP 3.2TB HH/HL Value Endurance (VE) PCIe Workload Accelerator	763838-B21
	HP 1.6TB HH/HL Value Endurance (VE) PCIe Workload Accelerator	763836-B21
	HP 1.3TB HH/HL Value Endurance (VE) PCIe Workload Accelerator	763834-B21
	Light Endurance (LE) PCIe Workload Accelerators	
	HP 5.2TB FH/HL Light Endurance (LE) PCIe Workload Accelerator	775672-B21
	HP 2.6TB HH/HL Light Endurance (LE) PCIe Workload Accelerator	775670-B21
	HP 1.3TB HH/HL Light Endurance (LE) PCIe Workload Accelerator	775668-B21
	HP 1.0TB HH/HL Light Endurance (LE) PCIe Workload Accelerator	775666-B21
	Mainstream Endurance (ME) PCIe Workload Accelerators	
	HP 1.4TB HH/HL Mainstream Endurance (ME) PCIe Workload Accelerator	729307-B21
	HP 700GB HH/HL Mainstream Endurance (ME) PCIe Workload Accelerator	729305-B21
	High Endurance (HE) PCIe Workload Accelerators	
	HP 700GB HH/HL High Endurance (HE) PCIe Workload Accelerator	708090-B21
	HP 350GB HH/HL High Endurance (HE) PCIe Workload Accelerator	708088-B21

Compatibility

Server Compatibility

ProLiant DL (rack-optimized):

- HP ProLiant DL360p Gen8
- HP ProLiant DL380p Gen8
- HP ProLiant DL380e Gen8
- HP ProLiant DL385p Gen8
- HP ProLiant DL560p Gen8
- HP ProLiant DL560e Gen8
- HP ProLiant DL580 Gen8
- HP ProLiant DL580 G7
- HP ProLiant DL585 G7

ProLiant ML (expansion-optimized):

- HP ProLiant ML310e Gen8
- HP ProLiant ML350p Gen8
- HP ProLiant ML350e Gen8

ProLiant SL (scalable line):

- HP ProLiant SL230s Gen8
- HP ProLiant SL250s Gen8
- HP ProLiant SL270s Gen8
- HP ProLiant SL4540 Gen8
- HP ProLiant SL4545 G7

NOTE: This is a list of supported servers. Some may be discontinued.

Standard Features

What is a PCIe Workload Accelerator?

The HP PCIe Workload Accelerators are PCIe card-based, advanced storage devices that use solid state storage technology directly on the PCI bus, assuring high read and write data rates and accelerated application performance. The associated application performance improvements will have a positive impact on business results and the ability to accelerate IO-bound workloads like databases, virtualization and data analytics, resulting in significant cost and time savings.

Single Level Cell and Multilevel Cell

NAND technology uses flash memory cells to store data. Single level Cell (SLC) stores one bit per cell, while Multi-level Cell (MLC) uses two bits per cell. While MLC can store more data within each device, it has lower endurance characteristics than SLC.

IO and Read/Write Performance

HP PCIe Workload Accelerators offer superior IO performance up to 715,000 READ IOPS and 95,000 WRITE IOPS, and high throughput up to 3.0 GB/s READ and up to 2.5 GB/s WRITE.

Latency

HP PCIe Workload Accelerators offer very low latency access to data, as low as 250 microseconds to write a 4K block and as low as 100 microseconds to read a 4K block. In other words, a virtually zero seek time compared to rotating magnetic media.

RAM Requirements

The amount of free RAM required by the driver depends on the size of the blocks used when writing to the drive. The smaller the blocks, the more RAM required. Here are the guidelines for each 100GB of storage:

Average Block Size (bytes)	System RAM usage (Megabytes) per 100GB of storage for Driver version 2.x and 3.x
8,192	280MB
4,096 (most common)	530MB
2,048	1030MB
1,024	2,000MB
512	3,970MB

Manageability

Command Line (CLI) tools for both Linux and Windows to configure, monitor, and upgrade firmware.

RealSSD Manager GUI for Windows and Linux.

PCI IDs

Vendor & Device IDs 1344:5150, 1344:5160

Subsystem Vendor & Device IDs 1590:D082, 1590:D083, 1590:0097, 1590:D098

Upgradeability

The controller for the HP PCIe Workload Accelerators can be upgraded in the future with new firmware. Online firmware update tools are available for all supported operating systems.

Wear-leveling

NAND Flash devices use semiconductor technology that has a finite amount of data that can be written to the device, defined as the Maximum Usage Limit. Projected lifetime of the NAND storage due to wear-out varies with type of NAND and amount of writes to the device.

Maximum usage

HP Value Endurance (VE) PCIe Workload Accelerators

HP 1.3TB VE PCIe Wrkld Accelerator	HP 1.6TB VE PCIe Wrkld Accelerator
1.3 TB	1.6 TB
0.5 Drive Writes/Day	0.5 Drive Writes/Day
1.1 PB written	1.6 PB written
HP 3.2TB VE PCIe Wrkld Accelerator	HP 6.4TB VE PCIe Wrkld Accelerator
3.2 TB	6.4 TB
0.5 Drive Writes/Day	0.5 Drive Writes/Day
3.1 PB written	6.3 PB written

Standard Features

HP Light Endurance (LE) PCIe Workload Accelerators

HP 1.0TB LE PCIe Wrkld Accelerator
1.0 TB
3 Drive Writes/Day
5.5 PB written

HP 1.3TB ME PCIe Wrkld Accelerator
1.3 TB
3 Drive Writes/Day
7 PB written

HP 1.4TB ME PCIe Workload Accelerator
1.4TB
3.9 Drive Writes/Day
10 PB written

HP 2.6 TB ME PCIe Wrkld Accelerator
2.6 TB
3 Drive Writes/Day
14 PB written

HP 5.2 TB ME PCIe Wrkld Accelerator
5.2 TB
3 Drive Writes/Day
28 PB written

HP Mainstream Endurance (ME) PCIe Workload Accelerators

HP 700GB ME PCIe Workload Accelerator
700 GB
3.9 Drive Writes/Day
5 PB written

HP 1.4TB ME PCIe Workload Accelerator
1.4TB
3.9 Drive Writes/Day
10 PB written

HP High Endurance (HE) PCIe Workload Accelerators

HP 350GB HE PCIe Workload Accelerator
350 GB
39 Drive Writes/Day
25 PB written

HP 700GB HE PCIe Workload Accelerator
700 GB
39 Drive Writes/Day
50 PB written

NOTE: Subject to Maximum Usage Limit - This is the maximum amount of data that can be written to the device before write burn-out. Drive writes per day (DWPD) is the maximum number of 4K host writes to the entire drive capacity per day over a five year period.

Data Integrity	Using advanced ECC techniques, the HP PCIe Workload Accelerators can correct up to 16 bits out of every 1024 bytes, with a design target of 1 sector in 10 to the 17th Power bits read probability of uncorrectable data.
OS Support	RHEL 4,5,6 (64-bit support only) SLES 11 (64-bit support only) Windows Server, 2008 R2 , 2012(64-bit support only) VMware ESX 5.x Ubuntu 12 **NOTE:** The HP PCIe Workload Accelerators are currently not supported as boot devices.
Configurations	Mixing of capacities is allowed, OS RAID
Warranty	3/0/0 warranty; Customer Self Repair (CSR) Subject to maximum usage limitations (Please see note under Additional Services Information).

Service and Support

Service and Support

HP Technology Services
HP Technology Services offers you technical consultants and support expertise to solve your most complex infrastructure problems. We help keep your business running, boost availability, and avoid downtime.

Protect your business beyond warranty with HP Care Pack Services
When you buy HP Options, it's also a good time to think about what level of service you may need. HP Care Pack services provide total technical support and expertise with committed response choices designed to meet your specific IT and business need.

HP Foundation Care services deliver scalable reactive support-packages for HP industry-standard servers and software. You can choose the type and level of service that is most suitable for your business needs. If you are running business critical environments, HP offers Proactive Care. This service helps you deliver high levels of application availability through a single point of contact, proactive service management and advanced technical response.

Here is the support service recommendation from the Foundation Care portfolio. For customized support service solution, HP can work with you to tailor a service solution for your unique support requirements using broader services portfolio of Foundation Care and Proactive Care.

Recommended Service

Recommended HP Care Pack Services for optimal satisfaction with your HP product

3-Year HP 24x7 4 hour Response, Foundation Care
HP Foundation Care 24x7 connects you to HP 24 hours a day, seven days a week for assistance on resolving issues – hardware onsite response within four hours and software call back within two hours after opening your case. Three years' coverage recommended with HP Care Pack Service.

http://h20195.www2.hp.com/V2/GetDocument.aspx?docname=4AA4-8876ENW&cc=us&lc=en

HP Installation of ProLiant Add On Options Service
This easy-to-buy, easy-to-use HP Care Pack service helps ensure that your new HP hardware or software is installed smoothly, efficiently, and with minimal disruption of your IT and business operations.

Related Services

HP Proactive Select Service
Provides a flexible way to purchase HP best-in-class consultancy and technical services. You can buy Proactive Select Service Credits when you purchase your hardware and then use the credits over the next 12 months. http://h20195.www2.hp.com/V2/GetPDF.aspx/4AA2-3842ENN.pdf

Additional HP Care Pack services for the HP PCIe Workload Accelerators can be found at:
http://www.hp.com/go/cpc

HP Support Center

Personalized online support portal with access to information, tools and experts to support HP business products. Submit support cases online, chat with HP experts, access support resources or collaborate with peers. Learn more http://www.hp.com/go/hpsc

HP's Support Center Mobile App** allows you to resolve issues yourself or quickly connect to an agent

Service and Support

for live support. Now, you can get access to personalized IT support anywhere, anytime. HP Insight Remote Support and HP Support Center are available at no additional cost with a HP warranty, HP Care Pack or HP contractual support agreement.

** HP Support Center Mobile App is subject to local availability

Parts and materials

HP will provide HP-supported replacement parts and materials necessary to maintain the covered hardware product in operating condition, including parts and materials for available and recommended engineering improvements.

Parts and components that have reached their maximum usage limitations as set forth in the manufacturer's operating manual, product quick-specs, or the technical product data sheet will not be provided, repaired, or replaced as part of these services.

The defective media retention service feature option applies only to HP PCIe Workload Accelerators replaced by HP due to malfunction.

For more information

To learn more on HP ProLiant servers, please contact your HP sales representative or HP Authorized Channel Partner. Or visit: http://www.hp.com/services/proliant

Technical Specifications

HP 6.4TB FH/HL Value Endurance (VE) PCIe Workload Accelerator 763840-B21	**Usable Capacity**	6.4 TB
	Technology	NAND Flash
	Max Sequential Throughput	Reads 1.7 GiB/s, Writes .965 GiB/s
	Access Latency (4KiB,Q1)	Reads 400 microseconds, Writes 45 microseconds
	IOPS (4KiB,Q16)	Read 44,000 IOPS, Write 53,000 IOPS
	Form factor	Full Height/Half length
	Bus Interface	PCIe 2.0 X 8
	Power (Nominal)	21W
HP 3.2TB HH/HL Value Endurance (VE) PCIe Workload Accelerator 763838-B21	**Usable Capacity**	3.2 TB
	Technology	NAND Flash
	Max Sequential Throughput	Reads 2 GiB/s, Writes .980 GiB/s
	Access Latency (4KiB,Q1)	Reads 400 microseconds, Writes 35 microseconds
	IOPS (4KiB,Q16)	Read 46,000 IOPS, 59,000 Write IOPS
	Form factor	Half Height/Half length
	Bus Interface	PCIe 2.0 X 8
	Power (Nominal)	21W
HP 1.6TB HH/HL Value Endurance (VE) PCIe Workload Accelerator 763836-B21	**Usable Capacity**	1.6 TB
	Technology	NAND Flash
	Max Sequential Throughput	Reads 2.6 GiB/s, Writes 1GiB/s
	Access Latency (4KiB,Q1)	Reads 110 microseconds, Writes 30 microseconds
	IOPS (4KiB,Q16)	Read 68,000 IOPS, Write 62,000 IOPS
	Form factor	Half Height/Half length
	Bus Interface	PCIe 2.0 X 8
	Power (Nominal)	21W
HP 1.3TB HH/HL Value Endurance (VE) PCIe Workload Accelerator 763834-B21	**Usable Capacity**	1.3 TB
	Technology	NAND Flash
	Max Sequential Throughput	Reads 2.2 GiB/s, Writes 1.18 GiB/s
	Access Latency (4KiB,Q1)	Reads 115 microseconds, Writes 30 microseconds
	IOPS (4KiB,Q16)	Read 66,000 IOPS, Write 69,000 IOPS

Technical Specifications

	Form factor	Half Height/Half length
	Bus Interface	PCIe 2.0 X 8
	Power (Nominal)	21W
HP 5.2TB FH/HL Light Endurance (LE) PCIe Workload Accelerator 775672-B21	**Usable Capacity**	5.2 TB
	Technology	NAND Flash
	Max Sequential Throughput	Reads 2 GiB/s, Writes 1.2 GiB/s
	Access Latency (4KiB,Q1)	Reads 110 microseconds, Writes 25 microseconds
	IOPS (4KiB,Q16)	Read 56,000 IOPS, Write 138,000 IOPS
	Form factor	Full Height/Half length
	Bus Interface	PCIe 2.0 X 8
	Power (Nominal)	25W, enhanced performance at 35W
HP 2.6TB HH/HL Light Endurance (LE) PCIe Workload Accelerator 775670-B21	**Usable Capacity**	2.6 TB
	Technology	NAND Flash
	Max Sequential Throughput	Reads 2.4 GiB/s, Writes 1.5 GiB/s
	Access Latency (4KiB,Q1)	Reads 110 microseconds, Writes 25 microseconds
	IOPS (4KiB,Q16)	Read 69,000 IOPS, Write 150,000 IOPS
	Form factor	Half Height/Half length
	Bus Interface	PCIe 2.0 X 8
	Power (Nominal)	25W, enhanced performance at 35W
HP 1.3TB HH/HL Light Endurance (LE) PCIe Workload Accelerator 775668-B21	**Usable Capacity**	1.3 TB
	Technology	NAND Flash
	Max Sequential Throughput	Reads 2.4 GiB/s, Writes 1.4 GiB/s
	Access Latency (4KiB,Q1)	Reads 110 microseconds, Writes 25 microseconds
	IOPS (4KiB,Q16)	Read 69,000 IOPS, Write 135,000 IOPS
	Form factor	Half Height/Half length
	Bus Interface	PCIe 2.0 X 8
	Power (Nominal)	25W
HP 1.0TB HH/HL Light Endurance (LE) PCIe Workload Accelerator 775666-B21	**Usable Capacity**	1.0 TB
	Technology	NAND Flash

Technical Specifications

	Max Sequential Throughput	Reads 2.2 GiB/s, Writes 1.3 GiB/s
	Access Latency (4KiB,Q1)	Reads 110 microseconds, Writes 25 microseconds
	IOPS (4KiB,Q16)	Read 67,000 IOPS, Write 130,000 IOPS
	Form factor	Half Height/Half length
	Bus Interface	PCIe 2.0 X 8
	Power (Nominal)	25W
HP 1.4TB Mainstream Endurance (ME) PCIe Workload Accelerator 729307-B21	**Usable Capacity**	1.4 TB
	Technology	NAND Flash
	Max Sequential Throughput	Reads 3.3 GiB/s, Writes 615 MiB/s
	Access Latency (4KiB,Q1)	Reads 130 microseconds, Writes 15 microseconds
	IOPS (4KiB,Q16)	Read 120,000 IOPS, Write 99,000 IOPS
	Form factor	Half Height/Half length Low profile PCI Express X8 slot (spec 2.0)
	Bus Interface	PCI Express 2.0 x 8
	Power (Nominal)	PCI Express x 8 (power spec 2.0) **NOTE:** The HP 1.4TB Mainstream Endurance PCIe Workload Accelerator can draw up to 30W power under peak workloads if power limiting is off. If power limiting is enabled on the 1.4TB drive, the maximum power consumed will be less than 25W.
	Operating Temperature	0-50°C (Operational)/-40-55°C (non-operational)/at max TBW -40C-+40C (non-operational)
	Supported Driver Version	SP138
HP 700GB Mainstream Endurance (ME) PCIe Workload Accelerator 729305-B21	**Usable Capacity**	700 GB
	Technology	NAND Flash
	Max Sequential Throughput	Reads 3.3 GiB/s, Writes 570 MiB/s
	Access Latency (4KiB,Q1)	Reads 110 microsoeconds, Writes 15 microseconds
	IOPS (4KiB,Q16)	Read 120,000 IOPS, Write 53,000 IOPS
	Form factor	Half Height/Half length Low profile PCI Express X8 slot (spec 2.0)
	Bus Interface	PCI Express 2.0 x 8
	Power (Nominal)	PCI Express x 8 (power spec 2.0)
	Operating Temperature	0-50°C (Operational)/-40-55°C (non-operational)/at max TBW -40C-+40C (non-operational)
	Supported Driver Version	SP138
HP 700GB High Endurance (HE) PCIe Workload Accelerator 708090-B21	**Usable Capacity**	700 GB
	Technology	NAND Flash
	Max Sequential Throughput	Reads 3.2 GiB/s, Writes 1.8 GiB/s
	Access Latency (4KiB,Q1)	Reads 100 microseconds, Writes 285 microseconds
	IOPS (4KiB,Q16)	Read 160,000 IOPS, Write 49,000 IOPS
	Form factor	Half Height/Half length Low profile PCI Express X8 slot (spec 2.0)
	Bus Interface	PCI Express 2.0 x 8

Technical Specifications

	Power (Nominal)	PCI Express x 8 (power spec 2.0)
	Operating Temperature	0-50°C (Operational)/-40-55°C (non-operational)/at max TBW -40C-+40C (non-operational)
	Supported Driver Version	SP134 or later
HP 350GB High Endurance (HE) PCIe Workload Accelerator 708088-B21	**Usable Capacity**	350 GB
	Technology	NAND Flash
	Max Sequential Throughput	Reads 3.2 GiB/s, Writes 1.8 GiB/s
	Access Latency (4KiB,Q1)	Reads 100 microseconds, Writes 285 microseconds
	IOPS (4KiB,Q16)	Read 160,000 IOPS, Write 45,000 IOPS
	Form factor	Half Height/Half length Low profile PCI Express X8 slot (spec 2.0)
	Bus Interface	PCI Express 2.0 x 8
	Power (Nominal)	PCI Express 2.0 x 8
	Operating Temperature	0-50°C (Operational)/-40-55°C (non-operational)/at max TBW -40C - +40C (non-operational)
	Supported Driver Version	SP134 or later
Environment-friendly Products and Approach	**End-of-life Management and Recycling**	Hewlett-Packard offers end-of-life HP product return, trade-in, and recycling programs in many geographic areas. For trade-in information, please go to: http://www.hp.com/go/green. To recycle your product, please go to: http://www.hp.com/go/green or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner. The EU WEEE directive (2002/95/EC) requires manufacturers to provide treatment information for each product type for use by treatment facilities. This information (product disassembly instructions) is posted on the Hewlett Packard web site at: http://www.hp.com/go/green. These instructions may be used by recyclers and other WEEE treatment facilities as well as HP OEM customers who integrate and re-sell HP equipment.

Summary of Changes

Date	Version History	Action	Description of Change:
10-Jun-2014	From Version 3 to 4	Changed	Overview section was updated Compatibility section was updated Maximum usage on Standard Features section was updated Service and Support Section was updated Technical Specifications was updated
30-Sep-2013	From Version 2 to 3	Added	Mainstream Endurance (ME) PCIe Workload Accelerators were added
15-May-2013	From Version 1 to 2	Changed	Made a Note change in the OS Support section.

Summary of Changes

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For hard drives, 1GB = 1 billion bytes. Actual formatted capacity is less.